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# A Strategy for Small Alternative Wastewater Systems (SAWS)

Environmental Protection Agency
Washington, DC

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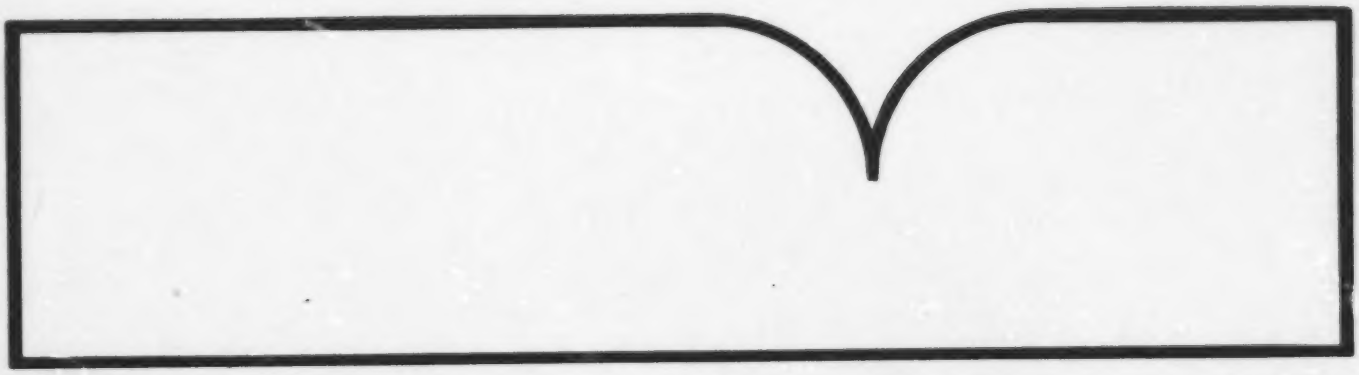

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# A Strategy for Small Alternative Wastewater Systems

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The objective of this Strategy paper is the development of a comprehensive planning and management approach to promote the use of and improve the performance of small alternative wastewater systems (SAWS). This Strategy covers a wide range of technological and managerial approaches to meet the wastewater collection, treatment, and disposal needs of small communities.

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# A STRATEGY FOR SMALL ALTERNATIVE WASTEWATER SYSTEMS (SAWS)

OFFICE OF WATER PROGRAM OPERATIONS
U.S. Environmental Protection Agency
Washington, D.C. 20460

DECEMBER 1980

TABLE OF CONTENTS


| SECTION | | PAGE |
|---|---|---|
| I. | INTRODUCTION AND BACKGROUND | 1-5 |
| | TABLE I - SAWS Technological Options | 4-5 |
| II. | STRATEGY FOR IMPROVING SAWS MANAGEMENT | 6-14 |
| | Task 1: SAWS Education | 7-9 |
| | Task 2: State SAWS Program Management | 9 |
| | Task 3: Federal SAWS Policy Clarification | 9-10 |
| | Task 4: Construction Grant Program Management | 10-11 |
| | Task 5: Research on SAWS Design, Regulation, and Management | 11-13 |
| | Task 6: Water Quality Management Planning Coordination | 13-14 |
| | Task 7: SAWS Program Support | 14 |
| III. | ISSUES AND OPPORTUNITIES | 15-19 |
| | Issues | 15-17 |
| | SAWS Program Management | 17-18 |
| | Opportunities for Encouraging SAWS | 18-19 |
| IV. | EXISTING SAWS PROGRAMS | 20-29 |
| | EPA SAWS Program | 20-23 |
| | Other Federal and Non-Federal National Programs | 23-25 |
| | State SAWS Programs | 25-26 |
| | Regional and Local SAWS Programs | 26-28 |
| | TABLE 2 - Clean Water Act Amendments Impacting SAWS | 29 |

APPENDICES

A. SAWS Strategy Recommended Activities by Participant, FY 1980-1983
B. State SAWS Program Activities
C. Items to be Considered in Establishing Local SAWS Programs
D. Management Dimensions of Small Flows Institutional Arrangements
E. Evaluation Criteria for Selection of Management Agencies

REFERENCES

## SECTION I
## INTRODUCTION AND BACKGROUND

The major objective of this Strategy paper is the development of a comprehensive planning and management approach to promote the use of and improve the performance of small alternative wastewater systems (SAWS). This Strategy covers a wide range of technological and managerial approaches to meet the wastewater collection, treatment, and disposal needs of small communities. This Strategy is designed to assist participants in the 208 water quality management (WQM) planning program, 201 construction grants program, and State and local regulatory officials in developing viable management systems to promote SAWS.

This paper describes current Federal, State, and local SAWS programs and identifies a number of problems and issues inhibiting implementation of adequate SAWS management programs. The following section outlines a number of recommendations to improve program coordination and communication, clarify organizational responsibilities, and develop and implement management systems.

Until recently, wastewater facility and WQM planners generally recommended that on-site systems be replaced by conventional systems wherever feasible since these systems were perceived as a temporary and inadequate treatment and/or disposal technique. The SAWS Strategy addresses the growing needs for adequate and cost-effective sewage treatment for the 25 percent of the Country's population in small communities not served by public conventional wastewater systems.

The Clean Water Act of 1977 included amendments to encourage the construction and/or rehabilitation of SAWS. These Amendments are summarized in Table 2 on page 29. The most significant change was the inclusion of two grant allotment set-aside programs.

A set-aside of 4 percent of the total construction grant allotment for each rural State is to be used for SAWS systems in rural communities. This set-aside is mandatory for 34 rural States having at least 25 percent rural population. This set-aside program has enabled some communities low on the State's priority list to obtain funding which would not have been available in the past. The level of participation in this program varies widely among the States; some States have fully committed their funds, while others stand to lose a portion of their allotments unless legislative extension is granted. As of September 30, 1980, $7.63 million of the total $77.1 million FY 1979 set-aside is at risk for reallotment because it has not been committed to specific projects. The use of FY 1980 set-aside appears to be brighter. About $15.5 million of the year's $60.5 million total has been obligated as of September 30, 1980.

The second set-aside program provides that 2 percent of the FY 1979 and FY 1980 total allotments and 3 percent of the FY 1981 allotment be used to encourage the application of innovative and alternative (I/A) technologies.

This set-aside is used to increase the Federal share from 75 percent to 85 percent of the project capital cost. Many I/A projects are for small communities and are primarily alternative systems such as community leachfields, total containment lagoons, and land treatment.

Section 35.917 of 40 CFR, Part 35, Subpart E, Construction of Treatment Works-Clean Water Act requires that facility plans contain a detailed evaluation of alternative methods of sewage treatment and disposal. Facility plans and WQM plans developed under EPA 201 and 208 programs frequently have concluded that conventional wastewater systems are prohibitively expensive for many small communities to build, operate, and maintain. Conventional systems can also have undesirable secondary impacts such as induced development and disruption of environmentally sensitive areas. In many instances they do not improve water quality significantly beyond that provided by SAWS.

When costs, environmental impacts, and results are objectively compared, SAWS technologies are often preferable for small communities. Some of the SAWS technologies which should be considered by small communities are outlined in Table 1 on pages 4 and 5. The particular technology selected would be determined by unique site specific characteristics, the community's wastewater needs and financial capabilities, financial capabilities of individual users, and the degree of treatment required to meet State standards and the environmental objectives of the community.

Local management systems using SAWS should be designed to meet the total wastewater needs of the community, not just those areas of the community receiving Federal construction grant assistance. Also in this regard, communities should examine the relationship of policies and administrative responsibilties for SAWS and conventional wastewater systems. Given limited resources, EPA will not be able to satisfy the total financial needs for construction assistance. Communities are encouraged to increase the use of alternative systems and improved management approaches even where not grant eligible or when funding is unlikely due to limited funds or low State construction grant priority.

Water Quality Management and facility plans have generally reflected the traditional bias against small flows systems in recommending the sewering of large areas presently served by septic tanks and other small flows systems. In addition, these plans have not generally documented significant on-site system failures and related water quality problems. Despite regulatory requirements to the contrary, conventional systems have been recommended in many of these plans without giving adequate consideration to alternative systems, including system rehabilitation and improved management.

As the comparative costs and environmental impacts of SAWS and conventional systems become better understood, facility planners and water quality managers will have to consider the application of SAWS technology to reduce user costs and maintain environmental quality whenever feasible.

This Strategy has been prepared by the Office of Water Program Operations (OWPO) with the assistance of the Municipal Environmental Research Laboratory (MERL) and Roy F. Weston, Inc. Implementation of the various recommendations requires commitment from EPA offices, other Federal agencies, State agencies, public interest groups, professional consultants, local elected and administrative officials, and others involved in the planning, construction and operation of wastewater facilities for small communities.

Section II outlines OWPO tasks for promoting SAWS through the Water Planning Division (WPD) and Facility Requirements Division (FRD). Sections III and IV discuss problems and current programs dealing with SAWS management. While these sections provide background, the Strategy as outlined in Section II can stand alone.

## TABLE 1
## SAWS TECHNOLOGICAL OPTIONS

A. Treatment

1. On-site methods

   a. anaerobic units (individual/cluster septic tanks, cesspools)
   b. aerobic units

2. Small flow treatment systems (e.g., package plants, multiple home units, ponds, lagoons, oxidation ditches)

   a. anaerobic
   b. aerobic
   c. physical/chemical
   d. land treatment

B. Disposal

1. On-site methods

   a. Conventional soil absorption systems
   b. Sand filter/surface discharge
   c. Evapotranspiration techniques
      - natural
      - mechanical
      - combined with soil absorption system
   d. Other soil absorption designs and techniques
      - mound systems
      - alternating soil absorption systems
      - dosing systems
      - soil field rejuvenation with hydrogen peroxide
      - other

2. Small flow

   a. surface water
   b. land application
   c. community soil absorption system
   d. aquaculture
   e. cluster systems
   f. other

C. Collection Methods

1. Conventional gravity sewers
2. Small-diameter gravity sewers
3. Pressure sewers
4. Vacuum sewers
5. Demonstrated hybrid systems

D. Wastewater/Water Supply Flow Reduction Techniques

1. Generic water consumption/wastewater flow reduction options (low flow, recirculating toilets, composting toilets, recycle/water purification)
2. Generic grey water recycling options
3. Other

E. Residuals Management (collection, treatment, disposal)

1. Septage
2. Package plant and on-site aerobic sludges
3. Recreational wastes (chemical toilets, etc.)
4. Other

## SECTION II
## STRATEGY FOR IMPROVING SAWS MANAGEMENT

Subsequent sections of this paper examine current Federal, State and local SAWS programs. This section outlines the OWPO Strategy for a more active and effective national SAWS program. Although this Strategy focuses upon recommended actions within OWPO's WPD and FRD, it is recognized that key roles are also played by other EPA offices and State and local planning and management agencies. This Strategy outlines recommendations for strengthening program coordination. The Strategy may need modification to be consistent with the 1990 Construction Grant Strategy currently being developed.

Nonpoint source pollution and health hazards can result from the failure of on-site sewage disposal systems. System failures are caused by improper siting, installation, operation, maintenance, or sizing of the system. Construction of conventional sewerage works would resolve the problems associated with failure of individual systems, but could create other problems equally as difficult to solve. These problems could include the lack of political and public acceptability of the project caused by expensive collection and treatment works which might not be necessary to solve the community's wastewater problem. In many of these instances, use of SAWS would result in more cost-effective wastewater collection and treatment with reduced negative social, economic, and political impacts. EPA is therefore promoting the use of SAWS technology to make cost-effective and adequate sewage treatment available to small communities at more affordable costs.

The general goals of the SAWS Strategy are outlined below. Action recommendations are organized in accordance with these general goals. The Strategy goals are as follows:

1. Promote expanded use of SAWS where they will provide adequate and cost-effective sewage disposal.

2. Promote acceptance of SAWS as viable methods of sewage treatment and disposal by changing the attitudes of State/local regulatory agencies and the general public.

3. Develop State and local SAWS management capabilities to include planning, O&M, facility planning, construction grant assistance, financial structuring, regulation, and enforcement.

4. Define SAWS responsibilities of EPA, other Federal agencies, and State and local agencies.

5. Evaluate, coordinate, and integrate SAWS programs to improve communications, reduce duplication, and clarify funding eligibilities.

6. Promote EPA funded prototype and demonstration projects to show that SAWS will function in an effective manner. Successful prototype projects may encourage communities uncertain of the reliability of SAWS to use them to fulfill their sewage treatment and disposal needs.

Implementation of the actions recommended will help insure that the goals of the SAWS Strategy are met. Many water pollution control, management and planning activities are the responsibility of OWPO. These include the following programs authorized under the Clean Water Act--overall State program management (106); construction grant program (201); construction grant program management (205(g)); and State and areawide planning (208). OWPO recommended action tasks appear below.

Task 1: SAWS Education

The lack of awareness of the cost and performance characteristics of SAWS under various conditions and management arrangements is the major deterrent to implementation of SAWS approaches. Adequate information regarding SAWS systems would result in more objective analyses and should lead to more frequent selection of the SAWS alternatives.

As described elsewhere in the Strategy, various SAWS training programs have been undertaken by OWPO, MERL, and the Center for Environmental Research Information (CERI). These training programs are designed to increase understanding of SAWS state-of-the-art technology and management systems, and they have assisted in SAWS implementation. SAWS educational programs could be improved by the following actions:

1. Expanding of SAWS seminars/workshops to include technology, financing alternatives, management alternatives, and facility plan reviews. The seminars/workshops should be designed specifically for the needs of the following groups--WQM planners, facility planners, facility plan review personnel, State and local SAWS program managers, EPA Regional and Headquarters program personnel, other Federal agency personnel, and consulting engineers.

The educational goals, requirements, objectives, and needs for each group mentioned above should be specifically determined. Each group should assist EPA in determining their educational needs. OWPO will evaluate these educational needs and develop training programs as necessary to fulfill each group's objectives.

2. Continuing assistance by OWPO to MERL and CERI in the design of training materials, manuals, seminars and workshops in order to:

a. Insure consistency of WQM and facility planning policies, needs, and objectives.

b. Satisfy the information and training needs and requirements of State and local engineering consultants, municipal officials, contractors and the public in order to improve the quality and implementation of facility and WQM plans.

3. Considering and implementing the SAWS Strategy by WQM agencies. This can be encouraged by OWPO through the following activities:

a. Development of SAWS planning/institutional analysis methods.

b. Limited direct technical assistance, as resources permit, through the financial management assistance program and through the development of model State SAWS management programs (See Task 2).

c. Development and distribution of SAWS training materials, policy papers, and guidance material to WQM agencies.

4. Providing guidance to MERL in the operation of the Small Flows Clearinghouse at West Virginia University in order to improve identification of educational needs, coordination of program objectives, and delivery of educational and training services.

5. Providing technical assistance by OWPO Headquarters and Regional Offices, as resources are available, to WQM and facility planning agencies, local officials, and others involved in SAWS planning and implementation.

6. Promoting inclusion of SAWS information in training materials developed by other Federal agencies, professional organizations and public interest groups. These training materials include professional practice handbooks, guidance materials, newsletters, workshop and conference agendas.

7. Promoting inclusion of SAWS in the civil/environmental engineering curriculum of colleges and universities.

OWPO SAWS educational action objectives for FY 1981 include:

1. Disseminate SAWS management manual being developed by MERL to all facility planning and WQM agencies.

2. Develop SAWS management training materials.

3. Conduct at least two regional SAWS workshops for WQM planning personnel, emphasizing institutional aspects of developing and implementing State and local SAWS programs.

4. Include major SAWS presentations in at least three national WQM professional/public interest group conferences.

5. Develop and initiate SAWS prototype programs.

6. Conduct ten design seminars for engineers and municipal officials.

7. Conduct two workshops for the academic community to encourage inclusion of SAWS technology in university and college curriculum.

8. Implement National Environmental Health Association (NEHA) seminar/workshops for sanitarians and public officials.

Given current limited resources, OWPO must make maximum use of SAWS educational opportunities that are available, including other EPA and Federal agency sources. Regional Offices, WQM and facility planning agencies, and local agencies involved with SAWS technology are strongly encouraged to participate in SAWS training programs. Each Regional Office should disseminate SAWS materials, identify regional SAWS training and information needs, and identify opportunities within the Region to disseminate SAWS training and public information materials.

Task 2: State SAWS Program Management

Consistent with the overall WPD Water Quality Management Strategy and the State delegation provisions of the construction grants program, State agencies are envisioned to play a major role in encouraging the implementation of SAWS approaches.

States are expected to provide a localized base of SAWS expertise, provide SAWS information, and as appropriate, advocate SAWS concepts for small communities and urban areas. In order to carry out this responsibility, States will need to reassess institutional relationships, legislation and regulations pertaining to SAWS, available resources, and State policies and attitudes regarding SAWS management.

EPA will encourage States to design and implement SAWS programs. Pursuant to this, detailed guidance regarding alternative State SAWS programs, including activities considered part of a minimum level program, will be developed. Support for development of State programs will be through the 201, 205(g), 106, and 208 programs. Initially, model State programs will be developed in a limited number of States through a SAWS prototype program. Implementation of State SAWS management programs will be included as part of the State/EPA (SEA) agreements.

Recommended State SAWS program activities appear in Appendix B.

Task 3: Federal SAWS Policy Clarification

A number of Federal agencies have SAWS construction grant, education, or research programs. Each agency has somewhat different polices, regulations, objectives, and funding strategies. These differences could cause confusion for State and local officials and hinder implementation of coordinated SAWS programs. Progress towards interagency cooperation has been made as a result of the White House Rural Initiatives Program.

To build upon past and current interagency efforts, the following OWPO activities are recommended:

1. Dissemination of information to WQM and facility plan reviewing agencies regarding the SAWS program of other Federal agencies.

2. Establishment of contact with staff of other Federal agencies to promote SAWS and improve program coordination as appropriate.

3. Providing assistance to the Office of the Assistant Administrator for Water and Waste Management (OWWM) in monitoring EPA involvement in interagency cooperation, including proposed interagency agreements. OWPO will provide appropriate EPA offices with suggested action items to facilitate SAWS implementation.

Task 4: Construction Grant Program Management

The administration of the 201 construction grants program is the responsibility of the Facility Requirements Division (FRD) and Municipal Construction Division (MCD) of OWPO. The recent reorganization of OWPO to include WPD will permit a closer relationship between the Step 1 facility planning program and the WQM planning program.

SAWS management programs must be developed by municipalities (grantees) as part of 201 facility plans. Where applicable, these programs should be consistent and coordinated with SAWS management programs and policies developed by State or areawide WQM agencies. FRD will provide guidance in the development of these management programs and related SAWS programs.

In addition to the management program aspect of 201 facility planning, there are a number of activities which can be included as part of comprehensive SAWS management projects. These activities include licensing of septage haulers, public education, and enforcement. Facility planning and WQM agencies will have to define program responsibilities and coordinate the development of management plans to control these activities.

All wastewater treatment works including SAWS whose construction will be grant funded must conform to the facility planning requirements of FRD. FRD performs a number of activities which encourage the implementation of SAWS technologies. The following ongoing and new actions and activities are recommended:

1. Streamline the 201 review and approval process, increase local community program participation, develop generic facility plans for SAWS management, and shorten the time of implementation.

2. Evaluate the effectiveness of rural and I/A set-aside programs and the priority system in general; develop and implement changes as appropriate.

3. Improve the effectiveness of small flows coordinators in Regional Offices by clarifying responsibilities, providing special training, distributing information materials, and developing special review procedures for SAWS projects.

4. Encourage States through 205(g) delegation agreements to improve their expertise in reviewing SAWS facility plans.

5. Clarify regulations and provide additional guidance regarding acceptable management arrangements for SAWS projects (e.g., ownership requirements, legal aspects of inspection access, user charge systems, maintenance, monitoring programs and septage management).

6. Continue the monitoring of small community facility plans for problem assessment techniques, understanding of state-of-the-art technology, cost-effective analysis, structuring of financing and adequacy of management programs. The facility plan should demonstrate the affordability of the project in terms of ability of the municipality and individuals to assume the local share of the project cost. Facility plans should also be closely examined to determine if the proposed administrative and management institutions adequately consider O&M, user charge systems, fee collection, and planning for future needs.

7. Encourage States to review and update design criteria for SAWS technology in order to minimize arbitrary standards and approval procedures; recognize varying local site conditions as appropriate.

8. Encourage States through 205(g) agreements to standardize the classification of soils and groundwater, and other data collected and presented for SAWS facility planning.

9. Develop generic model facility plans for SAWS to simplify and decrease the time necessary for facility planning.

10. Encourage States through 205(g) agreements to utilize these generic model facility plans for SAWS, and to make other program changes which will encourage and facilitate the implementation of SAWS management programs at the State level and, as appropriate, the areawide and facility planning levels.

11. Work with Farmers Home Administration (FmHA) to modify conflicting EPA and FmHA requirements for grant and loan assistance.

Task 5: Research on SAWS Design, Regulation, and Management

There is a general lack of awareness of and confidence in SAWS technologies and management approaches among consulting engineers, State and local officials, water quality planners, and facility planning engineers. This informational deficiency may be caused by four separate, but related problems: (1) an inadequately designed or underfunded technology transfer program, (2) unmet research needs, (3) indifference on the part of engineers,

planners, and local officials, and (4) historical bias resulting from unsuccessful experience with SAWS. The SAWS educational program will improve the information dissemination process, as will other SAWS activities to a lesser degree. This Strategy element will focus upon SAWS research needs.

In general, SAWS research should address the following areas:

1. Development of improved SAWS technology.

2. Development and evaluation of SAWS generic management programs.

3. Evaluation of field performance and costs of various SAWS technical and management approaches.

4. Identification of the water quality, public health, environmental, socioeconomic, and other impacts of SAWS technologies.

The focus for SAWS research within EPA is the Small Flows Research Program of MERL located in Cincinnati, Ohio. This program has been very productive with limited resources. MERL has always been responsive to the research needs of the construction grants program; however, the increased emphasis by WQM programs on nonpoint source control programs, including SAWS, has increased the demands made upon MERL for research support.

To meet SAWS research needs, it is recommended to the Office of Research and Development (ORD) that the following ongoing and proposed activities be continued, enhanced or initiated:

1. Conducting of research by MERL in accordance with OWPO identified research needs developed through the Municipal Wastewater and Spill Prevention Research Committee and other research committees.

2. Participating in ORD research committees by OWPO and communication of research needs and SAWS program status to ORD Headquarters staff and to the small flows program manager in MERL.

3. Exploring SAWS research outputs of other Federal agencies by OWPO and establishment of a liaison, as appropriate.

4. Having OWPO act as potential cosponsor of high priority research efforts and to cooperate with MERL, as appropriate, in review of research outputs, potential research projects, and educational/training materials.

5. Participating of MERL with OWPO (as resources permit) in development of educational materials, information transfer programs, and training efforts.

6. Providing of technical assistance by MERL to OWPO program offices, Regional Offices, States, the engineering community, WQM and facility reviewing agencies, as appropriate and as resources allow; and to aid in the development of technical assistance capabilities in the OWPO programs, Regional, and State offices.

7. Developing of case studies by MERL to assist OWPO in developing guidance regarding acceptable SAWS management arrangements.

Although MERL is the primary research vehicle, specific projects of a technical manual or "prototype" nature may be undertaken directly by OWPO. OWPO efforts will be coordinated with MERL in order to minimize duplication and obtain technical input.

Task 6: Water Quality Management Planning Coordination

SAWS implementation has been limited by a lack of coordination of local, areawide, and State WQM agencies and by the lack of explicit reference to SAWS components in WQM plans. In addition to the development of State management programs (Task 2), SAWS should be considered in any future State and areawide WQM plans. To accomplish this objective the following actions are recommended:

1. WPD to formulate increased guidance concerning the development of SAWS related work elements as applied to WQM for dissemination to Regional Offices and WQM agencies. This guidance should:

a. Provide assessment of SAWS contribution relative to other nonpoint source problems; identify Best Management Practices (BMP's) and priorities.

b. Evaluate existing SAWS regulatory/management programs.

c. Identify and select alternative regulatory/administrative institutional arrangements as a framework for specific WQM decisions included in 201 facility plans.

d. Examine Regional technical assistance and management program approaches.

e. Assist in the implementation of legal, institutional, and technical recommendations such as interagency agreements, model codes, and technical assistance.

2. WPD and Regional Offices to provide increased direct technical assistance to WQM agencies in the preparation and implementation of SAWS management recommendations.

3. Integration of SAWS Strategy with the groundwater prototype program, financial management assistance program, and other WPD programs.

4. WPD to improve monitoring and results transfer of SAWS WQM projects.

5. OWPO to clarify 201 and 208 project funding policies; SAWS components developed as part of WQM plans should provide background and support to development of more detailed wastewater facility plans. Whereas SAWS components of WQM plans include general problem identification and analyses of

existing and alternative institutional arrangements, 201 studies should conduct area/site specific analyses of water quality problems, system conditions, and technical solutions, and evaluate and select specific management/institutional/legal arrangements. OWPO and the Regional Offices will promote close coordination between 201 and 208 activities regarding SAWS implementation.

Task 7: SAWS Program Support

In addition to OWPO there are other organizations involved with SAWS programs. Included are other EPA offices, other Federal agencies, State and local agencies, professional associations, advocacy groups, and public interest groups. It is critical that the SAWS Strategy become well known and accepted by these organizations, especially where it is recommended that they take action (e.g., policy coordination, information transfer). Organizations which support the Strategy are expected to become program advocates, assist in the implementation of SAWS approaches, and leverage OWPO resources.

The following actions should assist in generating the support and assistance of these organizations:

1. Circulate the SAWS Strategy and subsequent guidance material to

   - o EPA offices, including Regional Offices
   - o Other relevant Federal agencies
   - o Relevant national professional and public interest organizations
   - o State and local WQM, facility planning, and construction grant agencies

2. Assist the organizations listed in item one in implementation of the Strategy recommendation, as appropriate.

3. Develop and maintain contact with other key EPA offices and participate in program and project review, as appropriate.

4. Develop and maintain working relationships with other Federal agencies, and national professional and public interest organizations.

## SECTION III
## ISSUES AND OPPORTUNITIES

This section addresses a variety of issues and opportunities regarding the planning, design, construction and management of small flows wastewater systems. These concerns are discussed in this section and fall into three general areas:

1. Issues regarding SAWS.
2. SAWS program management.
3. Opportunities for encouraging SAWS.

### Issues

On-site wastewater treatment and disposal techniques have been traditionally viewed by engineers, planners and others involved in community development as a temporary means of sewage treatment and disposal until conventional collection and treatment facilities became available. It is the intention of the EPA SAWS program to change this since greater use of alternative wastewater systems is environmentally and economically desirable. Engineers, planners, and others involved in community development must recognize that properly designed and constructed small alternative systems will dispose of sewage in a cost-effective, adequate and nonpolluting manner and are viable alternatives to conventional systems.

Although 25 percent of the country's population is served by small alternative systems, there are very few examples of facilities which have been systematically managed. Comprehensive management programs (i.e., from initial system approval to monitoring of system performance), for on-site and other alternative systems would result in improved effluent quality and reduced failure. A major thrust of the SAWS program will be to correct this deficiency by encouraging the implementation of sound management practices.

Facility plans prepared and reviewed in conformance with the requirements of the 1977 Clean Water Act are required to consider SAWS technology and appropriate management arrangements. In addition to proper SAWS management, including O&M, other concerns about the use of small flows systems include their potential secondary impacts and septage disposal. Since conventional systems also have undesirable secondary impacts, local officials must also consider the comparative secondary impacts of conventional and SAWS technologies. One such secondary impact is the effect of sewering on an area's development. Although SAWS technologies generally do not share the extensive growth inducing properties of conventional sewer systems, other undesirable secondary effects may result such as scattered development, "leapfrog" subdivisions, and infringement on environmentally sensitive areas. These growth patterns sharply increase the costs of providing water, utilities, and other public and private services.

Local planners are concerned that changes in on-site sewage disposal criteria and management designed to encourage the installation of SAWS systems may result in large scale scattered development. Undesirable growth patterns need not result if adequate land use controls are utilized. In some communities the only controls on land use are large lot zoning, siting and building requirements, and strict control of on-site sewage disposal facilities. While these controls may recognize land use and water quality relationships, site specific application of these controls may be unnecessarily restrictive. Wastewater management policies should be coordinated with other public service facilities and land use policies and controls. Communities should not rely solely on on-site sewage disposal policies as a technique to guide development. Through adoption of appropriate land use control policies and controls, communities should be able to meet both local wastewater management and land use objectives.

Septage management must be considered in a SAWS Strategy as septage is sometimes inappropriately disposed of in unsecured landfills or surface waters. If discharged to a publicly-owned treatment facility, septage can upset the plant's performance if the plant was not designed to accept the high strength waste, or if it is currently operating at design capacity. The septage disposal problem is further aggravated by increasingly stringent landfill siting and operational requirements. Facility plans and WQM plans should provide for septage management.

SAWS failures can generally be attributed to:

1. Unsatisfactory design/site evaluations including improper location, unsuitable soil, and inappropriate technology.

2. Inadequate review of system proposal by regulatory agency.

3. Unsatisfactory construction of system.

4. Hydraulic overloading resulting from inadequate capacity or improper homeowner utilization of the system.

5. Discharge of inappropriate substances such as solvents, toxic materials, and large quantities of nondegradable materials to the system.

6. Lack of appropriate O&M resulting in migration of solids to soil absorption system and subsequent clogging.

7. Lack of backup treatment units or pumps during period of power failure.

8. Structural deterioration caused by age or improper use.

The prevention of system failures must be an important consideration in the development of SAWS management programs. Improved system performance and reduced system failures can be achieved through the implementation of a SAWS

management program including design standards, review and approval procedures, inspection programs, O&M procedures, monitoring and enforcement programs, and educational programs.

Proper construction of an approved alternative system should be given special consideration in SAWS management systems to insure maximum system life. SAWS management systems must contain provisions for insuring that SAWS are constructed in accordance with approved plans.

SAWS Program Management

Current efforts to regulate small flows systems are highly fragmented among a number of different agencies at different governmental levels. Although a multi-tiered approach may be desirable under a comprehensive, well-structured management system, the existing SAWS institutional structures have generally been arrived at in de facto fashion. Undesirable management arrangements typically have:

1. Programs, policies, and procedures that are neither coordinated, mutually supported, nor consistent with those other agencies.

2. Responsibilities that overlap, are duplicated, or may not be specifically assigned.

3. Programs that lack accountability and program evaluation.

4. Certain functions that lack legal authorization.

5. Significant delays and additional costs resulting from a lack of clear and specific policy and organizational structure.

In addition to organizational constraints, management agencies may have other limiting factors including budgetary and staffing constraints. These may limit agency capabilities to adequately administer inspection, review, enforcement, operation, and other responsibilities. Given limited resources, philosophical objections, or perceived low priority, some agencies are reluctant to accept additional SAWS responsibilities. Acceptable SAWS management programs need not be prohibitively complex and expensive.

Specific procedures, policies, and design standards vary widely, even in the same State. In some areas there is a lack of published uniform design criteria and guidance. Many existing criteria are not based on performance data and are unnecessarily restrictive, contributing to arbitrary rejection of many SAWS projects. This lack of uniformity in design criteria and approval procedures inhibits technological innovation and restricts marketing, thus reducing potential cost savings and limiting the availability of improved systems. As more flexible standards and approval procedures are adopted by State and local governments, the growing acceptability of SAWS technology and management approaches should become known to the engineering community and equipment manufacturers. Acceptance of SAWS by State and local governments

will be greatly enhanced by demonstrating that SAWS can perform as well or better than conventional treatment works under specific operational circumstances.

Opportunities for Encouraging SAWS

Recent facility plans have more comprehensively evaluated wastewater treatment and disposal needs of and options available for rural and urban fringe areas. Implementation of the SAWS Strategy recommendations will enhance the construction grants and WQM programs as applied to rural areas by a systematic consideration of SAWS.

A number of opportunities exist for encouraging the utilization of SAWS. Many of these opportunities center around solving existing problems. The problems listed below provided direction to the formulation of the Strategy recommendations in Section II. Opportunities exist to promote SAWS and improve 201 facility plans by overcoming the following:

1. Bias against SAWS approaches by local officials, engineering consultants, and plan review personnel. This attitude may reflect a lack of understanding, and a belief that SAWS are technically inferior to conventional systems, or are a managerial and/or administrative burden. As a result, facility plans may only include a token analysis of SAWS. Unwarranted assumptions may be made in such areas as cost-effective analyses to insure the selection of conventional systems.

2. Lack of technology transfer, understanding and inexperience in applying SAWS state-of-the-art technology, including limited information on performance and reliability; capital, O&M, and management system costs; cost-effective analysis techniques; environmental and public health effects; secondary impacts; legal, administrative and institutional implications; soil capabilities and maintenance requirements. This information gap represents research deficiencies, information transfer problems, and limited coverage of SAWS technology in engineering school curricula and technical literature.

3. The lack of adequate analysis of existing system failures in Step 1 facility plans. If sanitary surveys and site evaluations are included in facility plans, they may not show the true extent of system failures. If system failures are carefully evaluated in a facility plan, the actual number of failures may be well below the perceived number; all that may be necessary to improve wastewater treatment and disposal would be the renovation of failed systems, upgrading of other on-site systems, and implementation of appropriate monitoring, maintenance, and other management activities.

4. Poorly understood and inadequately evaluated management systems. Improved guidance is needed for engineers and planners concerning specific acceptable management approaches including ownership requirements, maintenance programs, monitoring, inspections, user charges and other financing techniques, and types of management agencies.

5 Existing local or State regulations which discourage or prohibit SAWS implementation.

6. Inadequate State and local capabilities and commitment to effective SAWS management programs; lack of clear and consistent responsibilities and policies among State and local agencies.

7. Lack of consistency and clarity among various Federal and State SAWS funding programs (e.g., eligibilities, procedures, terms, objectives).

8. Lack of program coordination/clarity and consistent policies between SAWS and related EPA programs including WQM.

9. Reluctance of small communities to participate in the grants program because of time delays, red tape, anti-Federal feelings, lack of perceived problems, and lack of awareness of the grants program.

10. Inadequate consideration of areawide SAWS management approaches resulting from lack of legislative authority or institutional feasibility.

11. General reluctance of project officials already awarded a Step 1 grant to consider SAWS requirements and to respond to additional OWPO guidelines.

12. The initial resistance faced by the I/A and rural set-aside programs. This resistance stems largely from lack of understanding, concern for public health and systems reliability/risk, and delay in establishment of administrative procedures. A number of States may experience loss of grant funds through reallocation; however, the picture for FY 1981 appears to be improving.

13. Inadequate ORD resources for SAWS analysis.

## SECTION IV
## EXISTING SAWS PROGRAMS

Many agencies are involved in SAWS planning and technology. Activities include setting of standards and criteria, planning, research, approval of facility plans, O&M, grant support, technical assistance, and enforcement. Approaches to SAWS management and distribution of program responsibilities vary widely, especially at the State and local levels. This section provides an overview of current Federal, State and local programs.

### EPA SAWS Programs

The major offices directly involved in SAWS activities are WPD and FRD of OWPO, and MERL of the Office of Environmental Engineering Technology of the Office of Research and Development.

#### Water Planning Division

The Water Planning Division has general responsibility for WQM programs under Sections 106 and 208 of Public Law 95-21 Section 208 is a State and areawide planning grant program which includes problem assessments, analysis of improved management systems, and technical solutions.

Although there have already been many SAWS studies funded through section 208, many of the initial plans were insufficiently detailed in terms of scope, level of analysis, and specificity of recommendations.

Implementation of this SAWS Strategy should result in more effective guidance and monitoring of WQM SAWS projects and should be useful in making funding decisions.

Groundwater Strategy, other related prototype projects and the financial management assistance program are other WPD priority work areas related to the SAWS Strategy. In each case improved SAWS management is being examined through case studies and related methodology development. Improved SAWS management is considered a best management practice when used in conjunction with a comprehensive groundwater management plan.

#### Facility Requirements Division

In 1976 the continuing quality review of facility plans revealed that some small communities might not be capable of bearing the costs of conventional sewers and treatment plants. To confirm this a survey of 258 facility plans in 49 States was conducted that summer. This survey revealed that conventional treatment works could result in high user costs for some small communities. In an effort to deal with the serious problems of these high costs, the EPA Administrator issued a policy statement in December 1976 requesting that the Regional Administrators promote less costly wastewater treatment for small communities through measures including small alternative systems.

Since enactment of the Clean Water Act of 1977 EPA has vigorously encouraged the implementation of SAWS approaches through the 201 construction grants program. Much effort has been expended in developing appropriate SAWS regulations and promoting SAWS technology through educational and public information efforts. A National Conference for Less Costly Wastewater Treatment Works for Small Communities was held in April 1977 to emphasize small system technology. EPA has actively participated in the White House Rural Initiatives Program by suggesting ways less costly wastewater treatment can be delivered to rural America. Additional educational and public information efforts have included 50 presentations at meetings, conferences, workshops, and seminars over the past 2 years; more than 50 seminars designed to support SAWS and innovative and alternative technology; a descriptive foldout for alternative systems for extensive national distribution; and five handbooks concerning the use and management of alternative wastewater systems. A total of four separate series of seminars and workshops are being prepared by the Small Flows Clearinghouse at West Virginia University, the University of Wisconsin, and the National Environmental Health Association.

Municipal Construction Division

The Municipal Technology Branch (MTB) of the Municipal Construction Division (MCD) has played an active role in the development and evaluation of SAWS technologies. MTB interacts with SAWS programs in the following areas:

1. Ongoing evaluation of low level technologies such as land treatment, ponds, wetland application, and aquaculture. These technologies may be appropriate for use by small communities.

2. Management of the innovative and alternative technology program.

3. Technical and policy support.

Municipal Environmental Research Laboratory

Research on the performance characteristics of small alternative wastewater systems has been conducted by MERL for a number of years. Since the enactment of Public Law 95-217 the efforts of MERL have become increasingly visible and necessary for SAWS program development.

With limited funding MERL conducts SAWS research in the following areas:

Ongoing:

1. Evaluation of alternative technologies including aspects of performance, costs, applicability under varying site and climatic conditions, health and environmental impacts.

2. Development of an I/A system manual; providing technical support to Regional Offices in review of I/A proposals; development of I/A seminars.

Currently being developed:

1. "Planning Wastewater Management for Small Communities" (EPA-600/8-80-030) available at General Services Administration (8BRC), Centralized Mailing Lists Services, Denver Federal Center Building 41, Denver, Colorado.

2. SAWS institutional/management manual and case study analysis; final report available mid 1981.

3. Septage management manual.

4. "Design Manual, On-Site Wastewater Treatment and Disposal Systems;" final report available from EPA Center for Environmental Research Information.

5. Evaluation of new SAWS concepts including waste utilization, recycling, and advanced treatment and disposal.

6. Inclusion of SAWS technology in civil/environmental engineering curricula.

7. Evaluation of on-site construction methods; report due late 1980.

8. Administration of Small Flows Clearinghouse at West Virginia University.

9. Accelerated field performance evaluation of SAWS technology; output commencing FY 1981.

To be developed:

1. Evaluation of cost-effective site evaluation and sanitary surveys to improve problem assessment and system design; anticipated 1981-82.

2. Evaluation of SAWS management systems; anticipated 1981-82.

3. Cost-effectiveness evaluation procedures for SAWS options; anticipated 1981-82.

4. Impact of and control requirements for toxic substances; anticipated 1981-82.

The institutional/management manual currently in preparation by MERL will be of particular interest to WQM and facility planners in developing State and local SAWS programs. This manual will do the following:

1. Develop State and local case studies of existing SAWS management practices.

2. Identify issues, problem constraints, and opportunities for management.

3. Develop and evaluate generic management alternatives.

4. Make recommendations for implementation procedures for local planners and public officials.

Center for Environmental Research Information (CERI)

The Technology Transfer staff of CERI assembles research findings and distributes this information to the field. CERI has published a number of important manuals in recent years including, "Wastewater Treatment Facilities for Small Communities." CERI administered the Small Flows Clearinghouse prior to it being administered by MERL.

Other EPA Programs

The Robert S. Kerr Environmental Research Center (Office of Research and Development) at Ada, Oklahoma is conducting research to evaluate the effect of on-site wastewater treatment on groundwater. The results of this research will be used to determine the reliability of criteria used in the design of on-site wastewater systems. The Center is also involved in a series of workshops with OWPO on overload flow.

The National Training and Operational Technology Center (NTOTC) of OWPO located in Cincinnati, Ohio is preparing for presentation in FY 1981 two SAWS seminars for the academic community and ten for the engineering community.

Other Federal and Non-Federal National Programs

At the Federal level, other agencies with significant programs of interest in small flows systems include:

1. U.S. Department of Agriculture (Farmers Home Administration, Forest Service, Soil Conservation Service, Agricultural Research Service).

2. U.S. Department of Housing and Urban Development (Federal Housing Administration; lead on special interagency study of Modular Integrated Utility Systems).

3. U.S. Department of Commerce (Economic Development Administration, National Bureau of Standards).

4. Community Services Administration.

5. Appalachian Regional Commission and other regional economic development commissions.

6. U.S. Department of Interior (Office of Water Resources Technology, National Park Service, Bureau of Indian Affairs, Fish and Wildlife Service, Bureau of Land Management, Heritage Conservation and Recreation Service).

7. U.S. Department of Transportation (Federal Highway Administration).

8. U.S. Department of Defense (Army Corps of Engineers, Army and Navy Environmental Research Programs).

9. National Science Foundation.

The EPA SAWS Strategy should be closely coordinated with other Federal programs in terms of funding priorities, eligibilities, procedures, consistency of policy objectives, environmental objectives and research priorities. Coordination is necessary to eliminate inconsistent objectives, reduce confusion among local constituencies, promote joint programs, reduce duplication of effort, and facilitate Federal funding of projects.

Perhaps the most significant recent interagency effort is the White House Rural Initiatives Program. A Federal agency task group was assembled to coordinate the numerous programs involved in the technology, management, and financing of small community water and wastewater projects. For example, through these cooperative efforts Federal agencies are developing common criteria for conducting cost-effectiveness analyses and instituting coordination procedures and interagency facility plan reviews. Interagency efforts are underway to encourage cost-effective areawide management of O&M aspects of rural water and wastewater projects. As these interagency efforts are implemented at the Federal and State level, low-cost technologies will be given greater exposure and preference in small towns and rural areas.

A variety of national organizations have an interest in SAWS technology and management. These groups include:

1. Water Pollution Control Federation
2. American Society of Civil Engineers
3. Association of State and Interstate Water Pollution Control Agencies
4. National Association of Conservation Districts
5. National Association of Regional Councils
6. National Conference of State Legislators
7. Council of State Governments
8. National Association of Counties
9. National Association of Towns and Townships
10. International City Management Association
11. American Public Works Association
12. American Planning Association
13. American Society of Agricultural Engineers
14. National Sanitation Foundation
15. Water and Wastewater Equipment Manufacturers Association
16. Alternative Wastewater Management Association
17. Land Improvement Contractors Association

18. National On-site Sewage Treatment Association, Inc.
19. National Association of Home Builders
20. National Environmental Health Association
21. American Clean Water Association, and other environmental groups
22. Regional Engineering Design Standards Committees

These organizations have the capabilities of assisting in the implementation of the SAWS Strategy and improving management programs by providing public and professional education, research, testing, certification, and political support.

State SAWS Programs

States are currently involved in a wide variety of SAWS regulatory and management activities; however, most State efforts are generally neither comprehensive nor effectively organized. This section provides an overview of existing State SAWS programs to aid in developing program recommendations. This SAWS Strategy calls upon all States to assume a major leadership role.

Currently the responsibility for small system management may be shared by the State departments of natural resources, coastal zone management, plumbing, health, environmental protection and planning. After the formation of EPA, many States reorganized so that responsibility for construction grants management programs was more centralized. The responsibility for on-site sewage disposal, however, has generally remained a separate program area. This split could present institutional and management problems in the State's administration of the construction grants program. In addition, the development and enforcement of State wastewater standards could present problems if there is insufficient cooperation among State offices.

Many State agencies (primarily health departments) involved with the administration of SAWS programs have delegated portions of their responsibilities to regional and local agencies. These local agencies are largely responsible for providing the technical expertise for facility plan design review and supervision of facility construction.

Many of the local agencies providing SAWS project review are not responsible to the State water pollution control agency. Since it is usually the State water pollution control agency that administers the EPA's construction grants program, it is necessary that reliable lines of communication and coordination be established between the water pollution control agency and the State agency that regulates SAWS projects. If the State has delegated responsibility to the local level, reliable lines of communication must also be extended to the local level. In this way, the State and local water pollution control agency could be more attuned to the wastewater needs of rural communities and appropriately include them on State construction grant priority lists.

Since responsibility for the technical review of SAWS has largely been delegated to State and local agencies, the utilization of SAWS technology hinges on the acceptance of SAWS technology by these agencies. EPA educational efforts have helped in convincing local authorities that SAWS are viable sewage treatment and disposal systems. State and local authorities should institute legislation if they have not already done so to specifically allow ulitization of alternative technologies and establishment of necessary management agencies.

The wastewater management programs in many States have recognized the need for educational programs and technical guidance. In addition to educational and technical guidance, several States are considering modification of their statewide plan review procedures to include SAWS projects as a separate and distinct item with specialists in facility plan preparation and Federal funding acting on behalf of small communities. An overview of State programs is provided in "Management of On-site and Small Community Wastewater Systems," published by MERL as part of its institutional research project.

Regional and Local SAWS Program

Responsibility for regulating and managing SAWS has traditionally been delegated in large part to local government units, homeowners, and the private sector (e.g., developers, septage haulers, and septic tank system installers). Since SAWS management requires more comprehensive and structured administrative procedures, alternative local management systems must be evaluated as part of WQM and facility plans. The following broad options are available for local SAWS planners:

1. Strengthening existing institutional arrangements through additional authorities (e.g., new enabling legislation and interagency agreements) and resources (e.g., increased staff and budget).

2. Realignment and clarification of agency responsibilities combined with establishment of new public or private management agencies.

3. Re-evaluation of State and local SAWS responsibility to provide greater guidance and accountability.

Agencies that operate at the regional level will have a major role to play in the management of SAWS. They are involved in the planning, technical assistance, public education, and operating aspects of SAWS. While not all of these agencies have operational responsibilities, they may have other roles to play in facilitating implementation of SAWS programs. Possible management agencies include:

1. Regional planning commissions
2. Watershed associations
3. Interstate cooperatives
4. Regional sewer authorities, districts, or utilities

Many regional planning commissions and watershed associations are involved in the preparation of WQM plans that address the need for improved SAWS management programs.

Interstate cooperatives such as the Northwest States Task Force For On-site Disposal and the Ten State Standards Committee on Individual Sewage Systems of the Great Lakes-Upper Mississippi River Board of State Sanitary Engineers provide technical assistance and/or set standards. The cooperatives are involved in evaluating research and developing criteria and standards for on-site systems.

Regional sewer authorities have traditionally been involved in providing conventional sewerage service to urban and suburban areas. Some of these authorities have begun to recognize a role they could play in SAWS management by undertaking the following tasks--planning, construction, design, O&M, and septage management. The broad jurisdictional base and available technical expertise of regional authorities may make them well suited to provide these services. Many sewer authorities, however, have negative views of SAWS projects and are reluctant to accept additional responsibility for SAWS planning and management. Consequently these authorities are not inclined to pursue grant funds for these systems.

In recent years the responsibility for SAWS program management has begun to shift from the State to local levels. In many instances county units of government are viewed as the most appropriate level to provide services through a line department or special district. SAWS services may be provided by the following public and private entities--health department, planning/development department, building/plumbing department, 208 planning agency, soil and water conservation districts, wastewater districts, public utilities, homeowners associations, installers, and septage haulers.

The SAWS services provided by some of the local governmental organizations include management, O&M, and regulation for the systems in their jurisdictional areas. Regulations are generally promulgated by State and local health/environmental departments. Enforcement is carried out by State, county, or town health and/or environmental departments, or special wastewater districts.

One of the most important functions of the local regulatory and management agency is technical assistance and education aimed at homeowners, developers, and others interested in community development and environmental protection. Brochures and manuals which describe local approval procedures, SAWS technologies, and O&M should be made available. Local agencies can also conduct seminars/workshops on SAWS management and O&M in order to improve the state-of-the-art knowledge of engineers, homeowners, and installers.

In some areas wastewater management districts have been formed to manage and enforce regulations. Such SAWS management programs are administered by newly formed or pre-existing sanitary districts, special management districts, public authorities, municipal public works agencies, as well as private

organizations such as homeowners associations, publicly regulated utilities, rural cooperatives, private installers, and septage haulers. These locally organized management programs can own, operate, and maintain noncentral wastewater systems, or can contract with individuals to provide maintenance services. Case studies of local efforts to improve SAWS management are outlined in an interim study report titled "Management of On-Site and Small Community Wastewater Systems," (M687) prepared by MERL.

Although Federal and State agencies have important roles to play in SAWS management, it is the local agency which provides the necessary one-to-one interaction with the service area resident. The visibility and performance of the local representative is the key ingredient in developing and operating a successful management program. The most successful programs result when consensus exists regarding the nature of the local problems and the methods of solution. There is no substitute for strong, committed local leaders in the planning, design, and administration of a SAWS management program.

TABLE 2
CLEAN WATER ACT AMENDMENTS
IMPACTING SAWS

A set-aside of 2 percent (FY 1979 and 1980) and 3 percent (FY 1981) for I/A systems; 85 percent funding (as opposed to the usual 75 percent for capital costs of alternative technologies (Section 17; Section 202(a)).

A cost-effectiveness bonus of 15 percent for such technologies when publicly owned. That is, they can be 15 percent more costly and still be selected (Section 16; Section 201(j)).

A set-aside of up to 4 percent of the total grant amount for grants to small communities implementing alternative technologies. The set-aside will be 4 percent in the States with 25 percent or higher rural population, and may be negotiated at up to 4 percent for States with lower rural populations upon a governor's request (Section 27; Section 205(h)).

Assignment of higher priority to I/A project (Section 204(a)(3)).

A grant to fund all of the costs for modification or replacement of any facilities constructed with an 85 percent grant if such facilities have not met performance specifications unless negligence is involved (Section 202(a)(3)).

Creation of a clearinghouse for information on alternative technologies to aid in technology transfer (Section 7; Section 104(q)).

A requirement that such technologies be more systematically considered in the grants process, specifically in the facility plans (Section 12, Section 41, Section 201(g), Section 217).

Revised procedures for the evaluation of collection systems (Section 36, Section 211).

Provisions making individual systems grant eligible for rehabilitation under certain conditions (Section 14, Section 201(h)).

Provisions to reduce water consumption and sewage flow (Section 21; Section 204(a) and to study requirements for coordinating water supply and wastewater treatment (Section 72; Section 516).

Eligibility of alternative systems to serve existing private homes and businesses if a public agency applies for a grant, gives assurances of adequate maintenance, develops a monitoring program, and initiates a user charge and cost recovery system (Section 14; Section 201(h)); publicly-owned alternative systems are also grant eligible.

# APPENDICES

## APPENDIX A

### SAWS Strategy Recommended Activities by Participant, FY 1980-1983

### Office of Water Program Operations Activities

| Activity | Fiscal Year(s) Performed FY 1980/1981 | FY 1982 | FY 1983 |
|---|---|---|---|
| Develop new training materials (Task 1) | X | X | X |
| Disseminate training material (Task 1) | X | X | X |
| Conduct workshops/seminars (Task 1) | X | X | |
| Develop SAWS State prototypes (Task 2) | X | X | |
| Develop SAWS program guidance (Task 6) | X | X | |
| Provide technical assistance to WQM & facility planning agencies (Tasks 1,4,6) | X | X | X |
| Coordinate prototype programs (Task 6) | X | X | |
| Maintain and develop liaison with other EPA offices, other Federal agencies, public interest groups, States and professional associations (Tasks 3,7) | X | X | X |
| Streamline construction grants program procedures (Task 4) | X | X | |
| Coordinate with other EPA offices in promoting SAWS (Tasks 4,6,7) | X | X | X |
| Develop generic model facility plan (Task 4) | X | | |

## EPA Regional Office Activities

| Activity | Fiscal Year(s) Performed FY 1980/1981 | FY 1982 | FY 1983 |
|---|---|---|---|
| Identify SAWS training needs (Task 1) | X | | |
| Review proposed training materials (Task 1) | X | | |
| Disseminate training materials (Task 1) | X | X | X |
| Develop technical assistance capabilities (Task 1) | X | | |
| Provide technical assistance to WQM and facility planning agencies (Tasks 1,4,6) | X | X | X |
| Develop Regional SAWS guidance (Task 6) | X | X | |
| Promote support for SAWS approaches (Task 7) | X | X | X |
| Coordinate with review of small community facility plans (Task 4) | X | X | X |
| Identify candidates for SAWS prototypes; cooperate with SAWS prototype program (Tasks 2,6) | X | X | |

## State and Areawide Water Quality Management Agency Activities

| Activity | Fiscal Year(s) Performance FY 1980/1981 | FY 1982 | FY 1983 |
|---|---|---|---|
| Participate in training workshops (Task 1) | X | X | X |
| Develop SAWS components in WQM Plans (Tasks 2,6) | X | X | X |
| Participate in SAWS prototype program (Tasks 2,6) | X | X | X |
| Implement SAWS management program (Tasks 2,4,6) | X | X | X |
| Provide technical assistance to local agencies (Task 1) | | | |

## Other Office Activities

| Activity | Fiscal Year(s) Performance FY 1980/1981 | FY 198 | FY 1983 |
|---|---|---|---|
| MERL direct Small Flows Clearinghouse (Tasks 1,5) | X | X | X |
| MERL conduct SAWS management research (Task 5) | X | X | X |
| CERI conduct SAWS workshops and publish manuals (Task 1) | X | X | X |
| Office of Research and Development conduct SAWS research | X | X | X |

## APPENDIX B
## State SAWS Program Activities

A. Planning/Plan Review
- o Community Wastewater Management Plans (including 201 plans)
- o General Problem Assessments and Priority setting
- o Analysis of SAWS nonpoint source best management practices
- o Generic Model Facility Plans
- o Facility Plan Review Criteria
  - evaluation of alternatives guidance
  - economic and technical criteria
  - impact assessment methodology
- o Special Facility Planning Units
- o Guidelines for Facility Plan Preparation
- o Guidelines for Sanitary Surveys
- o Guidelines for Land Development Plan Preparation
- o Land Development Review Methodology and Impact Criteria

B. Regulations
- o Program Guidance Manuals (institutional issues)
- o SAWS Technology Approval Criteria and Procedures
- o Design Standards Development
- o Enforcement Procedures Guidance
- o Regulatory/Enforcement Program Evaluation Criteria
- o Enabling Legislation for Alternative System Management
- o Evaluation of Local Program Management (capabilities, effectiveness)
- o Monitoring of Ground and Surface Water Impacts of SAWS

C. Financing
- o Facility Planning and Design
- o Facility Construction
- o O&M (e.g., partial support regulatory/enforcement programs)
- o Institutional/Management Studies
- o Private System Rehabilitation/Replacement Loans
- o Priority List System for Small Communities
- o Uniform Financing Policy and Funding Criteria

D. Education/Training
- o Workshops/Seminars/Training Sessions
- o Technical (instruction) Manuals
- o Information Dissemination
- o Training/Certification/Licensing

E. Research and Development
- o Demonstration Projects (technology/management)
- o Monitoring of Full-scale Operating Systems
- o Field Testing of Units
- o Surveys of Operating Systems

## APPENDIX C
## Items to be Considered in Establishing Local SAWS Programs

### A. Planning

1. Development of WQM and facility management plans.
   - o Research and Development on noncentral system costs and performance.
   - o Integrate land use planning and wastewater management program needs and objectives.
   - o Determine most cost-effective and technologically feasible method of sewage disposal.

2. Coordination of plan preparation, plan review, enforcement and maintenance procedures.
   - o Coordination among various agencies.
   - o Arrange flow of project review among regulatory authorities to provide the most expeditious review.
   - o Act as coordinator among agencies to facilitate plan review and system installation.
   - o Eliminate duplication of effort.

### B. Site Evaluation and System Design

1. Determination of site limitations for noncentral systems.
   - o Develop procedures and data requirements to conduct site evaluations.
   - o Conduct site inspection and evaluation to ascertain unique site characteristics.

2. Develop guidelines for system design.
   - o Establish/evaluate performance standards, construction specifications, etc.
   - o Formulate requirements for licensing, certifying, and training system designers.

3. Issue permits for system construction.

4. Provide design assistance/ design publicly-owned systems.

### C. Installation

1. Establish program for site inspections during system installation.
   - o By local public health or environmental departments.
   - o By licensed professional engineer or other qualified individuals.
   - o Develop procedures and guidelines for installation supervision.

2. Establish requirements for licensing, certifying and training system installers.

3. Issue final inspection approval and/or permit.

D. Operation and Maintenance

1. Establish O&M procedures and responsibilities.
   - o Develop program of routine O&M.
   - o Conduct periodic inspections and evaluations of system operation.
   - o Develop enforcement and regulatory mechanism as required.
   - o Establish emergency maintenance procedures.

2. Develop program for septage handling, treatment, and disposal.
   - o Reporting mechanism to show amounts hauled, origin, method, and location of disposal.
   - o License septage haulers.
   - o Acceptable methods and locations of treatment and disposal.

3. Identify failing systems.
   - o Clearly define what constitutes a failure.
   - o Develop methodology of locating failed systems.
   - o Develop enforcement and regulatory mechanisms to correct failed systems.
   - o Initiate rehabilitation efforts.

E. Financing

1. Identify available sources of funding.
2. Secure funds for system construction and initial upgrading.
3. Set and collect user fees for O&M.
4. Establish and collect fees for permit issuance, plan review, monitoring, etc.

F. Monitoring

1. Monitor surface and groundwater conditions.
2. Monitor existing systems for failure.
3. Monitor construction to determine if it is being done in accordance with approved plans and specifications.

G. Public Education

1. Determine most productive method of educating engineers, developers, and general public in SAWS technology and benefits.
2. Develop programs to convey to general public, engineers, and developers information on SAWS technology, management systems, and benefits.
3. Inform public of maintenance procedures, proper operation and water conservation techniques.
4. Develop system for public reporting of system failure.

## APPENDIX D

## Management Dimensions of Small Flows Institutional Arrangements

A. Type of Management Agency

- o Municipality (including cooperative agreements)
- o County Government
- o Regional Planning Agency
- o State
- o Soil and Water Conservation District
- o Special District or Service District (single or multiple purpose)
- o Public Authority
- o Private Utility/Contractor
- o Homeowners Association
- o Rural Cooperative

B. Selection of Management Entity Responsibilities Through Consideration of:

1. Service Area Characteristics
   - o Multiple or singular jurisdictional area
   - o Land use and population distribution
   - o Growth prospects
   - o Governmental structure
   - o Willingness of local agencies to accept new responsibilities
   - o Responsiveness of private homeowners to assume certain responsibilities
   - o Management entity norm for locale
   - o Socioeconomic characteristics of service area

2. Type of Wastewater System Applied
   - o On-site or cluster versus community
   - o Surface versus subsurface disposal
   - o Traditional versus alternative/innovative
   - o Domestic waste versus industrial, commercial, institutional wastewater generation

3. Scope of Management Function
   - o Short-term or long-term system approach
   - o Remedial versus preventive solutions
   - o System ownership/operation and maintenance responsibilities
   - o Regulatory or advisory perspective by management entity

C. Forms of Management Approaches

1. Local Programs
   - o Management of on-site systems through site design and evaluation
   - o Management of on-site systems through O&M
   - o Management of on-site systems through combination of above
   - o Small community settings (e.g., lakes, rural developing areas, etc.)

2. State Programs
   - o Strong State programs promoting individual and small community systems management
   - o Combination of State and local participation in the management of individual and small community systems
   - o Strong local programs promoting individual and small community systems management

## APPENDIX E

## Evaluation Criteria for Selection of Management Agencies

A. Administrative Feasibility

1. Legal basis
2. Statutory authority
3. Relative complexity of SAWS program
4. Staffing requirements--number and level of expertise
5. Start-up time

B. Institutional Feasibility

1. Organizational changes required of existing institutions to implement program
2. Required coordination among existing institutions to implement program
3. Existing functional capabilities
4. Ability of institution to accommodate change
5. Flexibility of management agency to deal with operational problems
6. Ability of management agency to attract and maintain professional and nonprofessional staffing
   - o level of compensation in line with norm
   - o job satisfaction provided by position
7. Organization of management agency
   - o ratio of management to staff
   - o advancement for personnel built into organizational structure

C. Political and Public Acceptability

1. Attitude of public towards additional governmental intervention
2. Local government autonomy
3. Public participation in design and administration of program
4. Accountability
5. Demonstration that SAWS programs require professional management due to the needs and complexities of the program
6. Demonstration that the SAWS program is consistent with other plans, policies, and objectives of the jurisdictional area

D. Effectiveness in Meeting Health and Environmental Objectives

1. Attitude of jurisdictional agency towards enforcement of health/environmental regulations
2. Scope of health/environmental problems--State, local, regional or national significance
3. Existence of appropriate legislation to meet health/environmental needs

E. Cost-Effectiveness

1. Availability of grant assistance
2. Ability to obtain maximum grant assistance
3. Relative cost of alternative management programs (type of agency, public/private relationships, scope of service)

F. Financial Feasibility

1. Ability of management agency to act independent of budget constraints caused by rapidly changing or politically expedient decisions
2. Ability of management agency to raise revenue
   - o assessments
   - o permit fees
   - o user charges
   - o inspection fees
   - o connection fees
3. Ability of users to pay for system O&M, rehabilitation, or replacement
4. Distribution of costs to various user groups
5. Impact of SAWS programs on
   - o present and future local community budgets
   - o provision of other public services

G. Secondary Socioeconomic Effects

1. Nature, extent, and distribution of impacts
2. Potential amelioration of impacts
3. Ability of management agency to cope with reaction of users to adverse effects of SAWS program
4. Ability of management agency to respond to changing user needs

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